Astrophysical Bulletin 2016 vol.71 N4, pages 463-474

On the formation of TW Crv optical radiation

Shimansky V., Mitrofanova A., Borisov N., Fabrika S., Galeev A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016, Pleiades Publishing, Ltd.We present the analysis of the optical radiation of the young pre-cataclysmic variable TW Crv. Spectroscopic and photometric observations were obtained at the SAO RAS 6-m BTA telescope and at the Russian-Turkish RTT-150 telescope. The light curves of the system posses nearly sinusoidal shapes with the amplitudes of Δm > 0.m7, what is typical for young pre-cataclysmic variables with sdO-subdwarfs and orbit inclinations of less than 45◦. The optical spectrum contains dominant radiation of the hot subdwarf with the HI and He II absorption lines and strong emission lines, which are formed in the atmosphere of the secondary owing to the reflection effects. Radial velocities of the cool star were measured by analyzing the λλ 4630–4650 Å Bowen blend, which for the first time allowed to determine the component masses. A numerical simulation of the light curves and spectra of TW Crv, obtaining a complete set of systems fundamental parameters was carried out. The hot star parameters prompt its belonging to the sdOsubdwarf class at the stage of transition to the cooling white dwarf sequence. The absence of its observable planetary nebula is caused by a long-lasting evolution of the system after the common envelope state. The secondary component has a luminosity excess, which is typical for other young sdO-subdwarf precataclysmic variables. Its position on the “age−−luminosity excess” diagram points at the accuracy of the obtained set of TW Crv fundamental parameters and at the similarity of its evolutionary and physical conditions with that of other BE UMa-type objects.

http://dx.doi.org/10.1134/S199034131604009X

Keywords

atmospheres—methods, binaries, close—subdwarfs—stars, spectroscopic